STAPLE LENGTH SAMPLING SCHEDULES FOR RAW WOOL PACKAGED IN BAGS

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Livestock Division

AMS--182

May 1957

CONTENTS

Agriculture--Washington

SUMMARY

The purpose of this work was to develop schedules for drawing samples to determine the staple length of raw wool packaged in bags.

The resulting factual length data for various grades indicated that the sampling methods used in this study on 46 lots of wool were reasonably accurate and consistent. The principle of the method was one of drawing staples from bags using a wool sampling tool (illustrated in figure 1).

The differences in average length between duplicate samples and duplicate lots were small and within the range expected to arise due to chance.

Analyses also revealed that no systematic differences existed in staple length between bags of a lot or the position of the staple draws within the bags.

Indications were that more staples should be drawn per lot for the coarser and longer wools than for the finer wools if the same precision of results is to be attained.

Sampling schedules were developed, based on the variances found in this study, to show the number of bags to be sampled from a lot of a given size when a certain number of staples are drawn per bag. The practical application of these schedules is set forth.

The most economical sampling pattern for determining staple length appears to be the one involving the sampling of the minimum number of bags prescribed in a lot of a given size.

STAPLE LENGTH SAMPLING SCHEDULES FOR RAW WOOL PACKAGED IN BAGS

By Donald D. Johnston, H. Dean Ray, and Elroy M. Pohle 1/

INTRODUCTION

The measurable wool fiber characteristics and other properties important in the classification and description of raw wool are the subject of continuous study in the Department of Agriculture in connection with wool standardization work.

To aid in this work, laboratory test methods have been developed for the defining of such properties as yield, fineness, and length. These tests are made on small amounts or samples of wool and their reliability depends largely upon the sample tested being representative of the entire lot.

In view of this factor, objective sampling methods, such as the coring method for sampling lots of raw wool in bags for yield determination, have been developed and have been used in the trade for a number of years. More recently this method has been used for drawing samples for specifying the fineness of raw wool. In line with this work a method of sampling raw (grease) wool in bags has been developed for length designation. This method can be used at the same time the bags are handled during coring operations.

The work upon which this report is based deals with the sampling for length portion of a study involving 46 lots of Commodity Credit Corporation wool. The purpose was to provide a factual basis for the computation of a sampling schedule for assessing the length of raw wool packaged in bags and to evaluate the results of the sampling method used.

A publication (5) 2/ reporting results of the sampling of 19 lots of grease wool for staple length was based on the use of hand samples drawn at random from the pile or bin after the blend was made. These samples consisted of approximately 3 pounds and were made up of 25 or more randomly selected pieces. It was concluded that the measurement of 50 staples drawn at random from these samples seemed adequate for the Fine and 1/2-Blood wools since the errors arising out of drawing staples from these samples fell within the measurement class interval of 1/4 inch, and the accuracy gained by measuring more staples for coarser wools did not warrant the extra work. Data based on the measurement of normal (unstretched) staple lengths, showing the sampling error of the mean for various numbers of staple measurements within the different grade and length classes, were also presented.

Another publication (6) reports the sampling of 149 lots of graded grease wool in which two 3-pound samples were drawn at random from the grade pile. Twenty-five pieces of fleeces were selected at random from each sample and a

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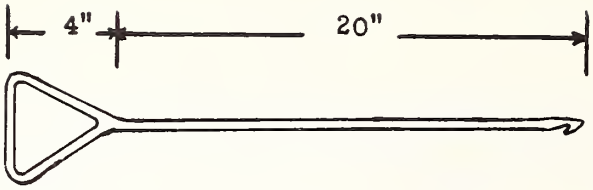
2/ Underscored numbers in parentheses refer to Literature Cited, page 13



Wool staple sampling tool of 3/8-inch steel rod; flat-tapered point with barb 1/8-inch wide and 3/8-inch deep

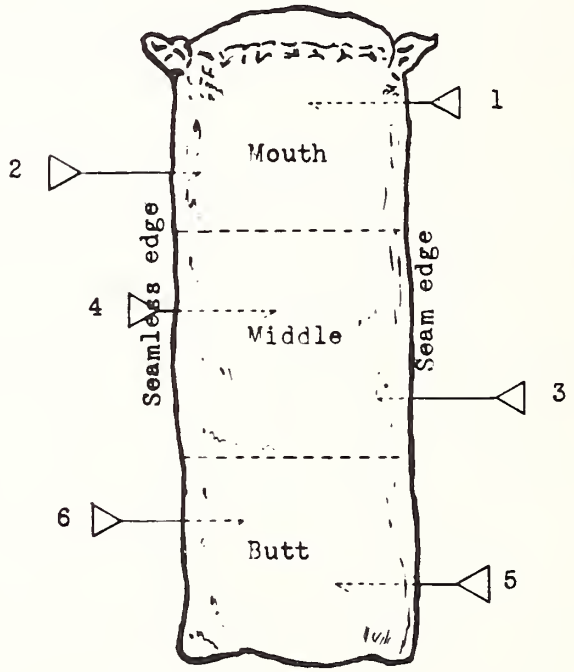


Figure 1.- Sampling pattern used in drawing grease wool staples from bags for length determination

staple was drawn from each piece for measurement, resulting in 50 staple measurements to represent an individual lot.

A standard method of sampling and testing staple length of wool in the grease is covered in detail by ASTM Standards on Textile Materials (2).

SAMPLING AND TESTING

The sampling and testing for this study were performed on 46 lots of 1952 and 1953 Commodity Credit wools. All lots were graded for fineness and length and came from various producing areas in the United States.

Sampling.--With the exception of 3 lots, in which cases the number of bags sampled was less than 20, the sampling procedure was similar for all lots. Six staples were drawn per bag and 20 bags per lot were sampled. The staples were obtained from the bags laid down for coring and were taken just previous to coring.

The wool staple sampling tool depicted in figure 1 was used to draw the staples from the bags. By thrusting the point of the tool into the bag and withdrawing it by a direct pull with a slight turn, a small quantity of wool was caught in the hook as the tool was withdrawn. By following the sampling pattern illustrated in figure 1, 3 staples were drawn from the seam edge of the bag and 3 from the opposite seamless edge. The draws were so located that staples from the mouth, middle, and butt of the bag were obtained. The depth the tool was inserted into the bag was so guaged that three different levels of the bag were reached. The staples drawn from the seamless side of the bag were kept separate from those drawn from the seam side.

Testing.--The measurement method for determining the normal staple length of grease wool is similar to those methods described in publications (2) and (5). The staples were first prepared to a uniform size of approximately 1/4-inch in diameter. Each staple was laid out on a velvet-covered board, and then a ruler was used to determine its normal length without stretching or elongating. The length was measured to the nearest 1/4 inch. All measurements were made by two operators, one measuring the staples drawn from the seam side of the bag and the second operator measuring those drawn from the seamless side. The measurement results of the two operators were combined. The mean length, standard deviation, and coefficient of variation were calculated for the normal staple length of each lot. This information, along with other statistical data, is listed for each lot in tables 9 and 10 of the appendix.

Table 1.- Comparison of average normal length of grease wool staples drawn from seam and seamless edges of bags, by lot

Lot number	Average normal length of (duplicate samples) staples drawn from bags along: Seam edge	Seamless edge	Difference in average length	t
	Inches	Inches	Inches	
5195X	2.87	2.89	0.02	0.35
5195Y	2.85	2.88	0.03	0.34
5151	2.92	2.98	0.06	0.66
748X	2.54	2.57	0.03	0.35
748Y	2.54	2.41	0.13	1.64
15637	2.55	2.49	0.06	0.84
5222	2.63	2.61	0.02	0.22
KK2	2.40	2.32	0.08	1.08
2816	2.28	2.30	0.02	0.19
1042	2.04	2.08	0.04	0.59
722½X	2.89	2.81	0.08	0.76
722½Y	2.94	2.98	0.04	0.39
P3B	3.09	3.12	0.03	0.29
5074X	2.93	2.99	0.06	0.56
5074Y	2.94	3.00	0.06	0.60
4956	2.74	2.83	0.09	1.11
2205	2.42	2.29	0.13	1.85
5571	2.41	2.38	0.03	0.39
5432	2.50	2.43	0.07	0.86
4837X	3.32	3.41	0.09	0.73
4837Y	3.27	3.28	0.01	0.08
39045X	3.23	3.28	0.05	0.40
39045Y	3.12	3.27	0.15	1.21
58003X	3.11	3.19	0.08	0.66
58003Y	3.15	3.13	0.02	0.18
6	2.88	2.94	0.06	0.52
1041	3.48	3.42	0.06	0.47
39151	2.33	2.48	0.15	1.76
4023	2.84	2.89	0.05	0.47
5034X	3.66	3.65	0.01	0.08
5034Y	3.68	3.57	0.11	0.73
255	3.80	3.70	0.10	0.78
53265	3.60	3.54	0.06	0.50
29002X	4.12	4.08	0.04	0.25
29002Y	4.09	3.87	0.22	1.42
39338	3.88	3.86	0.02	0.13
52113	3.58	3.56	0.02	0.17
55015	3.37	3.29	0.08	0.70
120D	4.44	4.32	0.12	0.71
110E	5.14	5.05	0.09	0.30
210E	5.12	4.98	0.14	0.75
16851	3.90	3.93	0.03	0.21
2-200E	5.41	5.04	0.37	2.16 1/
200E	5.62	5.45	0.17	0.90
2-200G	6.07	6.18	0.11	0.33
100G	6.22	6.20	0.02	0.08

1/ Significant at the 5-percent probability level

COMPARISON OF STAPLE LENGTH MEASUREMENTS ON DUPLICATE SAMPLES AND DUPLICATE LOTS

In an effort to obtain information relative to the adequacy of the sampling methods used in this study, the comparisons given in tables 1 and 2 were made.

The data presented in table 1 are length comparisons of duplicate samples from 46 lots. The average length of the staples drawn from the seam and seamless edges of the bags, the difference in average length between the two, and the "t" value (4), used for testing the significance of the differences, are listed for all 46 lots.

As may be seen by reference to table 1, there is only one comparison (lot 2-200E) in 46 in which the difference in average length between the duplicate (seam and seamless) samples is detected by the "t" test to be significant. Therefore, for the samples tested, adequate duplication of results appears to be obtained by using the method of sampling for staple length employed in this study.

Further evaluation of the adequacy and consistency of the sampling methods used in this study can be observed in table 2. The data in this table compare the lengths of staples drawn from 9 duplicate lots (X-lot and Y-lot portions of the same original lot). The differences in average lengths, together with the "t" values for 9 comparisons are also listed.

There was no significant difference in staple length for duplicate lots according to the "t" test.

All things considered, therefore, it would appear that the sampling methods used for this study are reasonably accurate and consistent, especially since the differences in length between duplicate samples and samples from duplicate lots were small and within the range expected to arise due to chance.

VARIANCE IN STAPLE LENGTH COMPARED BY LOT, BY BAG, AND BY POSITION OF DRAW

Twenty of the 46 lots used in this study were selected for a special examination. In this examination staples were drawn and individually identified as to lot number, bag number, and position of draw in accordance with the numbers given in figure 1. Six staples per bag were drawn and 20 bags per lot were sampled.

Analyses of the measurements of the staple lengths were made in an effort to ascertain if a difference existed in samples from bags within a lot and in samples drawn from different positions within the bags. The results of these analyses are summarized in tables 3 and 4.

Table 2.- Comparison of average normal length of grease wool staples drawn from X-lot and Y-lot portions of the same original lot

Original lot number	Average normal length of (duplicate lots) staples drawn from: X-lot	Y-lot	Difference in average length	t [1/]
	Inches	Inches	Inches	
5195	2.88	2.87	0.01	0.16
748	2.55	2.48	0.07	1.20
722½	2.85	2.96	0.11	1.52
5074	2.96	2.97	0.01	0.14
4837	3.37	3.28	0.09	1.02
39045	3.26	3.20	0.06	0.68
58003	3.15	3.14	0.01	0.12
5034	3.66	3.62	0.04	0.41
29002	4.10	3.98	0.12	1.09

1/ A "t" value of 1.96 is significant at the 5-percent probability level.

It would appear from the analysis of variance data for staple length listed in tables 3 and 4 that the differences existing in length between the staples drawn from the (seam and seamless) edges of the bags and those drawn from different levels (mouth, middle, and butt) of the bag were not statistically significant.

There was only one case (lot 748X) in which the between level (mouth-middle-butt) mean square was significantly larger than the residual mean square, when tested at the 5-percent probability level.

In no instance were the between edge mean squares significantly larger than the residual mean squares when tested at the 5-percent probability level.

There were three lots in which the between bag variance was found to be significant at a probability level of 5-percent or more.

The sum of squares for edges, levels, and residual, and the degrees of freedom for each were pooled and a within-bag mean square was calculated for each lot. From these data between-bag and within-bag mean square was calculated for each lot and between-bag and within-bag standard deviations were calculated. This information is given in tables 5 and 6.

It will be noted there were 5 lots in which between-bag standard deviations were not listed. In these cases, the within-bag mean square was larger than the between-bag mean square; thus no between-bag standard deviation value could be calculated by the procedure (3) used in this study.

On the basis of the average between-bag and within-bag mean squares given in tables 5 and 6, and for the lots 60's and finer, the mean standard deviation value for between-bags was 0.11 inch and for within-bag 0.48 inch. For the lots 58's and coarser the mean standard deviation value for between-bags was 0.15 inch and for within-bags 0.67 inch.

STAPLE LENGTH SAMPLING SCHEDULES

From the estimated within- and between-bag standard deviations, sampling schedules based on the variances found for the lots graded 60's and finer, and the lots graded 58's or coarser, were set up to show the number of bags to be sampled from a lot of a given size if a certain number of staples were drawn per bag.

The sampling schedules as shown in tables 7 and 8 set forth the smallest and largest standard deviation values observed in tables 5 and 6. These are actual values obtained from the lots tested in which estimates for both within- and between-bag standard deviations were available.

In table 7 the standard deviation estimates for within-bags of 0.48 inch and for between-bags of 0.11 inch were based on the average within- and between-bag mean squares of the 10 lots given in table 6.

These schedules were also set up for a precision of plus or minus 0.125 inch at a 95 percent confidence level. The calculations followed a procedure and an equation described by the Standards Manual of the ASTM (1).

The data of tables 5 and 6, and of the tables of the appendix reveal that for the lots tested in this study, the variation in staple lengths within a lot becomes greater as the wool becomes longer and coarser. In the practice of sampling, this indicates that more staples should be drawn per lot for the coarser and longer wools than for the finer wools if the same precision of results is to be attained.

Referring to tables 7 and 8 it can be seen that as the within- and between-bag standard deviations become greater, the number of bags per lot to be sampled increases if the number of staples drawn per bag is held constant.

APPLICATION OF SAMPLING SCHEDULE

In practical application, sampling for staple length could be made in conjunction with coring operations. For example--a lot of wool 60's or finer in grade and consisting of 100 bags is being cored for yield determination. The variation in staple length is estimated to be average for the grade; thus the schedule for average within- and between-bag standard deviations (0.48 and 0.11) is applicable. Let us assume the coring schedule for yield calls for one core to be drawn from each bag as a lot is loaded into a freight car. Referring to the length sampling schedule of table 7 the minimum sampling involved to maintain the prescribed precision would be to draw 1 staple per bag from 58 bags. The 58 bags to be sampled are selected at random from the entire lot of 100 bags, and the staples should be drawn before the cores are drawn.

Another example--a lot of 50's grade wool has an average length uniformity; when the coring schedule for yield determination calls for drawing 5 cores from 25 of the 100 bags, the minimum sampling involved for staple length would be to draw at random 6 staples per bag from 23 of the 25 bags to be cored.

From the length measurement results can be calculated the average staple length, standard deviation, and coefficient of variability. Also, the distribution of lengths may be expressed by plotting a cumulative frequency curve, thus showing graphically the various percentages of different length staples.

Table 3.- Analysis of variance for staple length, lots 60's and finer

Source of variance	Degrees of freedom	Mean squares for lots: 5195X	5151	748Y	5222	2816	1042	722½X	5074Y	4956	5432
Bags	19	0.2477	0.2836	0.1748	0.5847 2/	0.3399	0.1321	0.4389	0.3389	0.2762	0.2553
Edges	1	0.0187	0.1333	0.4688	0.0047	0.0188	0.0630	0.1880	0.0750	0.2520	0.1505
Levels	2	0.2412	0.2313	0.7641 1/	0.2016	0.1787	0.3787	0.2146	0.1787	0.2170	0.2828
Residual	97	0.2504	0.2415	0.1828	0.1840	0.3282	0.1358	0.3166	0.2954	0.1832	0.1856
Total	119										

1/ Significant at the 5-percent probability level
2/ Significant at the 0.1-percent probability level

Table 4.- Analysis of variance for staple length, lots 58's and coarser

Source of variance	Degrees of freedom	Mean squares for lots: 4837X	39045X	58003X	6	4023	5034X	53265	29002X	55015	16851
Bags	19	0.7042 1/	0.6092	0.5399	0.3581	0.4176	0.6183	0.6668 1/	0.7724	0.3672	0.8053
Edges	1	0.2297	0.0750	0.2083	0.1334	0.0630	0.0047	0.1333	0.0333	0.2083	0.0422
Levels	2	0.2735	0.1037	0.8735	0.0193	0.1193	0.6297	1.1005	0.7312	0.0146	0.4537
Residual	97	0.4133	0.4550	0.4223	0.4254	0.3376	0.4305	0.3701	0.7372	0.3998	0.5730
Total	119										

1/ Significant at the 5-percent probability level

Table 5.- Between-bag and within-bag mean square and standard deviation estimates for staple length, lots 60's and finer

Lot number	Mean squares		Standard deviation	
	Between-bag	Within-bag	Between-bag	Within-bag
	Inches	Inches	Inches	Inches
5195X	0.2477	0.2479	-	0.50
5151	0.2836	0.2403	0.10	0.49
748Y	0.1748	0.1973	-	0.44
5222	0.5847	0.1826	0.26	0.43
2816	0.3399	0.3221	0.05	0.57
1042	0.1321	0.1399	-	0.37
722½X	0.4389	0.3132	0.14	0.56
5074Y	0.3389	0.2908	0.10	0.54
4956	0.2762	0.1846	0.12	0.43
5432	0.2553	0.1872	0.11	0.43
Average	0.3072	0.2306		

Table 6.- Between-bag and within-bag mean square and standard deviation estimates for staple length, lots 58's and coarser

Lot number	Mean squares		Standard deviation	
	Between-bag	Within-bag	Between-bag	Within-bag
	Inches	Inches	Inches	Inches
4837X	0.7042	0.4086	0.22	0.64
39045X	0.6092	0.4442	0.17	0.66
58003X	0.5399	0.4292	0.14	0.66
6	0.3581	0.4144	-	0.64
4023	0.4176	0.3305	0.12	0.57
5034X	0.6183	0.4302	0.18	0.66
53265	0.6668	0.3823	0.22	0.62
29002X	0.7724	0.7300	0.10	0.85
55015	0.3672	0.3903	-	0.62
16851	0.8053	0.5651	0.20	0.75
Average	0.5859	0.4525		

Table 7.- Staple length sampling schedule for a precision of plus or minus 0.125 inch at a 95-percent confidence level, based on various within- and between-bag standard deviations, lots 60's and finer

Standard deviations		Number of staples per sampled bag	Number of bags in a lot								
			10	25	50	75	100	150	200	300	500
Within-bag	Between-bag		Number of bags to be sampled								
0.43	0.11	1	-1/	-	46	47	47	48	48	48	48
		2	-	23	24	25	25	25	25	25	26
		3	-	16	17	17	18	18	18	18	18
		4	-	13	14	14	14	14	14	14	14
		5	9	11	11	12	12	12	12	12	12
		6	8	9	10	10	10	10	10	10	10
		7	7	8	9	9	9	9	9	9	9
		8	7	8	8	8	8	9	9	9	9
		9	6	7	8	8	8	8	8	8	9
		10	6	7	7	7	7	7	7	7	8
0.48	0.11	1	-	-	-	57	58	58	59	59	59
		2	-	-	30	30	30	31	31	31	31
		3	-	20	21	21	21	21	22	22	22
		4	-	15	16	16	17	17	17	17	17
		5	-	13	14	14	14	14	14	14	14
		6	10	11	12	12	12	12	12	12	12
		7	9	10	10	11	11	11	11	11	11
		8	8	9	9	10	10	10	10	10	10
		9	7	8	9	9	9	9	9	9	10
		10	7	8	8	8	8	8	9	9	9
0.56	0.14	1	-	-	-	-	78	79	80	81	81
		2	-	-	40	41	41	42	42	43	43
		3	-	-	28	29	29	30	30	30	30
		4	-	20	22	23	23	23	24	24	24
		5	-	17	18	19	19	20	20	20	20
		6	-	15	16	17	17	17	17	17	17
		7	-	13	14	15	15	15	15	16	16
		8	10	12	13	14	14	14	14	14	14
		9	9	11	12	13	13	13	13	13	13
		10	8	11	11	12	12	12	12	12	12

1/ No estimates, specified precision cannot be obtained with this number of staples per sampled bag

Table 8.- Staple length sampling schedule for a precision of plus or minus 0.125 inch at a 95-percent confidence level, based on various within- and between-bag standard deviations, lots 58's and coarser

Standard deviations		Number of staples per sampled bag	Number of bags in a lot								
			10	25	50	75	100	150	200	300	500
Within-bag	Between-bag		Number of bags to be sampled								
0.57	0.12	1	-1/	-	-	-	81	81	82	82	83
		2	-	-	41	42	42	42	43	43	43
		3	-	-	28	29	29	29	30	30	30
		4	-	21	22	22	23	23	23	23	23
		5	-	17	18	19	19	19	19	19	19
		6	-	15	16	16	16	16	17	17	17
		7	-	13	14	14	14	15	15	15	15
		8	10	12	13	13	13	13	13	13	13
		9	9	11	12	12	12	12	12	12	12
		10	9	10	11	11	11	11	11	11	11
0.67	0.15	1	-	-	-	-	-	112	113	114	115
		2	-	-	-	57	58	59	59	60	60
		3	-	-	38	39	40	41	41	42	42
		4	-	-	30	31	31	32	32	33	33
		5	-	23	25	26	26	27	27	27	27
		6	-	20	22	22	23	23	23	23	24
		7	-	17	19	20	20	21	21	21	21
		8	-	16	17	18	18	19	19	19	19
		9	-	15	16	17	17	17	17	17	18
		10	-	14	15	15	16	16	16	16	16
0.85	0.10	1	-	-	-	-	-	-	178	179	179
		2	-	-	-	-	89	90	90	91	91
		3	-	-	-	60	60	61	61	61	61
		4	-	-	45	45	46	46	46	46	47
		5	-	-	36	37	37	37	38	38	38
		6	-	-	31	31	31	32	32	32	32
		7	-	25	27	27	27	27	27	28	28
		8	-	22	24	24	24	24	24	24	25
		9	-	20	21	21	22	22	22	22	22
		10	-	18	19	20	20	20	20	20	20

1/ No estimates, specified precision cannot be obtained with this number of staples per sampled bag

In most cases the cost of selecting and positioning the bags for sampling would probably be greater than the cost of drawing and measuring the staples. It would appear, therefore, from the data in tables 7 and 8, that the most economical sampling pattern for determining staple length only is the one involving sampling the least number of bags in a given lot.

No systematic sampling plan for determining staple length can be set up which will be applicable to all conditions. The factors influencing sampling such as space, time, and cost will vary; however, factual data in this study may be used to devise suitable procedures to fit an individual case.

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APPENDIX

Table 9.- Statistical values representing data identified with normal (unstretched) staple lengths, lots 64's and finer, and 60's and finer

C.C.C. grade classification	C.C.C. length classification	Lot number	Staples measured	Mean	Standard error of mean	Standard deviation	Coefficient of variation	Maximum length	Minimum length	Range
			Number	Inches	Inches	Inches	Percent	Inches	Inches	Inches
Fine, 64's and finer	Strictly staple	5195X	120	2.88	0.046	0.50	17.36	4.50	1.50	3.00
	do	5195Y	120	2.87	0.041	0.45	15.68	4.00	1.75	2.25
	do	5151	120	2.95	0.046	0.50	16.95	4.50	1.75	2.75
	Staple and good French combing	748X	120	2.55	0.046	0.50	19.61	4.00	1.50	2.50
		748Y	120	2.48	0.037	0.41	16.53	3.75	1.25	2.50
	do	15637	120	2.52	0.037	0.41	16.26	4.00	1.75	2.25
	do	5222	120	2.62	0.045	0.49	18.70	3.75	1.50	2.25
	do	KK2	120	2.36	0.038	0.42	17.80	3.75	1.50	2.25
	Short French combing, clothing and stubby	2816	120	2.28	0.053	0.58	25.44	5.00	1.00	4.00
		1042	120	2.06	0.035	0.38	18.45	3.75	1.25	2.50
½ blood, 60's and finer	Staple and good French combing	722½X	120	2.85	0.051	0.56	19.65	4.25	1.25	3.00
		722½Y	120	2.96	0.049	0.54	18.24	4.50	1.75	2.75
		P3B	120	3.10	0.054	0.59	19.03	4.50	1.75	2.75
		5074X	120	2.96	0.052	0.57	19.26	4.50	1.50	3.00
		5074Y	120	2.97	0.050	0.55	18.52	4.25	1.50	2.75
	Average and good French combing	4956	120	2.79	0.040	0.44	15.77	4.50	1.75	2.75
		2205	120	2.36	0.036	0.40	16.95	3.75	1.50	2.25
	Short French combing and clothing	5571	120	2.40	0.036	0.40	16.67	4.50	1.50	3.00
		5432	120	2.47	0.040	0.44	17.81	4.00	1.75	2.25

Table 10.- Statistical values representing data identified with normal (unstretched) staple lengths, lots 56/58's, 48/50's, 46's, and 44/40/36's

C.C.C. grade classification	C.C.C. length classification	Lot number	Staples measured	Mean	Standard error of mean	Standard deviation	Coefficient of variation	Maximum length	Minimum length	Range
			Number	Inches	Inches	Inches	Percent	Inches	Inches	Inches
3/8 blood, 56/58s	Staple and good French combing	4837X	120	3.37	0.060	0.66	19.58	5.50	1.50	4.00
	do	4837Y	120	3.28	0.062	0.68	20.73	5.25	1.75	3.50
	do	39045X	120	3.26	0.061	0.67	20.55	5.00	1.75	3.25
	do	39045Y	120	3.20	0.060	0.66	20.63	6.00	1.75	4.25
	do	58003X	120	3.15	0.060	0.66	20.95	5.50	2.00	3.50
	do	58003Y	120	3.14	0.056	0.61	19.43	5.50	1.75	3.75
	do	6	120	2.91	0.057	0.63	21.65	4.75	1.50	3.25
	do	1041	120	3.45	0.065	0.71	20.58	5.50	1.75	3.75
	do	39151	120	2.40	0.045	0.49	20.42	4.25	1.25	3.00
	do	4023	120	2.86	0.056	0.61	21.33	5.00	1.50	3.50
1/4 blood, 48/50s	Staple and good French combing	5034X	120	3.66	0.059	0.65	17.76	5.75	2.00	3.75
	do	5034Y	120	3.62	0.077	0.84	23.20	7.50	2.00	5.50
	do	255	120	3.75	0.061	0.67	17.87	5.50	1.75	3.75
	do	53265	120	3.57	0.060	0.66	18.49	5.50	2.00	3.50
	do	29002X	120	4.10	0.066	0.72	17.56	7.00	2.25	4.75
	do	29002Y	120	3.98	0.078	0.85	21.36	6.75	2.25	4.50
	do	39338	120	3.86	0.078	0.86	22.28	6.50	1.50	5.00
	do	52113	120	3.57	0.057	0.62	17.37	5.50	2.25	3.25
	do	55015	120	3.33	0.055	0.60	18.02	5.50	2.25	3.25
	do	120D	120	4.38	0.083	0.91	20.78	6.75	2.25	4.50
Low 1/4 blood, 46s	Staple and good French combing	110E	78	5.09	0.139	1.23	24.16	9.00	2.00	7.00
	do	210E	120	5.05	0.092	1.01	20.00	8.50	2.50	6.00
	do	16851	120	3.91	0.074	0.81	20.72	5.50	2.00	3.50
	do	2-200E	120	5.23	0.086	0.94	17.97	8.25	3.50	4.75
	do	200E	120	5.53	0.097	1.06	19.17	10.25	2.75	7.50
Common and braid, 44/40/36s	Staple and good French combing	2-200G	60	6.12	0.167	1.29	21.08	9.00	3.25	5.75
		100G	60	6.21	0.125	0.97	15.62	9.00	4.50	4.50